CLAIMS

The following listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1-3. (Canceled)

4. (Previously Presented) A method as claimed in claim 68 wherein said up-conversion medium is excited by simultaneous absorption of two or more photons of the same or different energy.

5. (Previously Presented) A method as claimed in claim 68 wherein said up-conversion medium is excited by sequential absorption of two or more photons of the same or different energy.

6. (Previously Presented) A method as claimed in claim 68 wherein said up-conversion medium is an up-conversion phosphor that absorbs long wavelength radiation and emits light at shorter wavelength.

7. (Canceled)

8. (Previously Presented) A method as claimed in claim 68 wherein said up-conversion medium is an electron-trapping phosphor.

9. (Canceled)

10. (Canceled)

11. (Previously Presented) A method as claimed in claim 68 wherein said up-conversion medium provides an up-conversion process based on the excitation of lanthanide ions in an inorganic matrix.

12-16. (Canceled)

17. (Previously Presented) A method as claimed in claim 68 wherein said solid phase is a glassy matrix.

18. (Previously Presented) A method as claimed in claim 68 wherein said solid phase is a crystalline matrix.

19. (Previously Presented) A method as claimed in claim 68 wherein said solid phase is an organic or inorganic polymer.

20. (Previously Presented) A method as claimed in claim 68 wherein said analyte causes a change in said proximity between said energy donor species and said energy acceptor species.

21-24. (Canceled)

25. (Currently Amended) A method as claimed in claim 68 wherein said surface of said solid phase has bound thereto recognition ligands selected from the group consisting of antibodies, lectins oligonucleotides, nucleic acids, biotin, streptavidin~~,~~ and avidin ~~and other proteins~~.

26-45. (Canceled)

46. (Previously Presented) A method as claimed in claim 68 wherein said energy donor species emits light in two or more luminescence emission peaks that differ in efficiency of energy transfer to said energy acceptor species and wherein measurements of emission at wavelengths characteristic of at least two such peaks are made.

47.-56. (Canceled).

57. (Currently amended) A method as claimed in claim 68 wherein the solid phase is provided with a continuous, discontinuous or partial metallic coating ~~of a metal~~ for enhancing transfer of energy from the upconversion medium to the acceptor species.

58. (Currently amended) A method as claimed in claim 57 wherein the solid phase has bound thereto recognition ligands selected from the group consisting of antibodies, lectins oligonucleotides, nucleic acids, biotin, streptavidin~~,~~ and avidin ~~and other proteins~~ bound to said ~~metal~~ metallic coating.

59. (Currently amended) A method as claimed in claim 57 wherein the ~~metal~~ metallic coating is discontinuous and recognition ligands selected ~~freom~~ from the group consisting of antibodies, lectins oligonucleotides, nucleic acids, biotin, streptavidin~~,~~ and avidin ~~and other proteins~~ are bonded to the solid phase at discontinuities in the ~~metal~~ metallic coating.

60.-67 (Canceled)

68. (Currently Amended) A method of detecting or quantifying an analyte by means of luminescence assay based on detection of transfer of energy between an energy donor species and an energy acceptor species as an acceptor of said energy, in which

(i) the energy donor species is an upconversion medium that affects a transition to an excited state by absorption of electromagnetic radiation having an energy less than that of said transition and is provided as a solid phase having a surface or is ~~immobilised~~immobilized in a solid phase having a surface or is ~~immobilised~~immobilized on a surface of a solid phase and

(ii) said acceptor species ~~is~~ when bound to the surface of said solid phase in proximity to the energy donor species~~, said acceptor species when so bound~~ being excited by energy transfer from the said excited state of the donor species, the method comprising the steps of

(a) combining a sample potentially containing the analyte with the energy donor species and the acceptor species or a precursor thereof that is converted by the analyte to the acceptor species,

(b) irradiating said donor species with said electromagnetic radiation to excite the donor species to its said excited state for said energy transfer between the excited donor species and acceptor species bound to the surface, said analyte being one which ~~provides the~~if present either causes the acceptor species ~~bound~~ to bind to the surface in said proximity to the donor species or ~~provides for~~ causes displacement of said bound acceptor species from said proximity thereby resulting in change in the excitation condition of at least one of the donor species and acceptor, species; and

(c) detecting luminescence in at least one spectral region of the emission of said donor species or of said acceptor if said acceptor is luminescent, provided that the excitation of such a luminescent acceptor to a luminescent state emitting in said spectral region of the emission of the acceptor does not occur by absorption of a single quantum of the radiation used to excite the donor species.

69. (Previously Presented) A method as claimed in claim 68 wherein said transfer of energy from said energy donor to said energy acceptor is detected by quenching of emission of said energy donor species or by sensitised emission of said energy acceptor species.

70. (Previously Presented) A method as claimed in claim 68 wherein said transfer of energy from said energy donor species to said energy acceptor species is detected by a change in luminescence decay rate of said energy donor species.

71. (Previously Presented) A method as claimed in claim 68 wherein said analyte mediates formation or dissociation of a bound complex between said energy donor species and said energy acceptor species.

72. (Previously Presented) A method as claimed in claim 68 wherein said analyte catalyses formation or cleavage of a linkage between said energy donor species and said energy acceptor species.

73. (Previously Presented) A method as claimed in claim 68 wherein said analyte interacts with said energy acceptor species or said precursor thereto causing a change in colour thereof or a change in fluorescence efficiency thereof.

74. (New) A method as claimed in claim 68 wherein the up-conversion medium comprises trivalent praseodymium as dopant.

75. (New) A method as claimed in claim 68 wherein the up-conversion medium comprises trivalent thulium as dopant.

76. (New) A method as claimed in claim 68 wherein the up-conversion medium comprises trivalent erbium as dopant.

77. (New) A method as claimed in claim 68 wherein the up-conversion medium incorporates trivalent ytterbium as a sensitising agent.

78. (New) A method as claimed in claim 68 wherein the up-conversion medium comprises a ytterbium–sensitised, erbium-dope system.

79. (New) A method as claimed in claim 68 wherein the up-conversion medium comprises a ytterbium-sensitised thulium-dope system.